Persistent Off-the-Shelf meACE2-CAR-IL-15 NK Cells Derived from CD34(+) Cord Blood Stem Cells to Prevent and Treat COVID-19

Grant Award Details

Persistent Off-the-Shelf meACE2-CAR-IL-15 NK Cells Derived from CD34(+) Cord Blood Stem Cells to Prevent and Treat COVID-19

Grant Type: Discovery Research Projects

Grant Number: DISC2COVID19-11947

Project Objective: Develop engineered NK cells expressing a mutated extracellular domain of ACE2 and IL-15 for the specific killing of SARS-CoV-2-infected cells with long-term persistence in vivo.

Investigator:

Name:	Jianhua Yu
Institution:	City of Hope, Beckman Research Institute
Type:	PI

Disease Focus: COVID-19, Infectious Disease

Human Stem Cell Use: Adult Stem Cell

Award Value: $150,000

Status: Active

Grant Application Details

Application Title: Persistent Off-the-Shelf meACE2-CAR-IL-15 NK Cells Derived from CD34(+) Cord Blood Stem Cells to Prevent and Treat COVID-19

Public Abstract:

Research Objective

To develop and characterize meACE-2-CAR-IL15 NK cells expressing a mutated ACE2 and IL-15, allowing specific killing of SARS-CoV-2-infected cells and long in vivo persistence of the engineered cells.

Impact

To provide a timely, novel, and effective cell therapy for COVID-19, which has no FDA-approved vaccines and only remdesivir has received an emergency-use approval.

Major Proposed Activities

- To further optimize expansion of umbilical cord blood (UCB) hematopoietic stem cells (HSCs) and engineer the expanded with the meACE2-CAR-IL15 retrovirus.
- To differentiate UCB HSCs transduced with meACE2-CAR-IL15 into NK cells, followed by cell expansion.
- Proof of concept: In vitro evaluation of meACE2-CAR-IL15 NK cells.
- Proof of concept: In vivo evaluation of meACE2-CAR-IL15 NK cells.
- Manuscript submission for publication & preparation for an INTERACT meeting with the FDA.
- N/A

Statement of Benefit to California:

SARS has presented as a major public health threat in the past. A new SARS, COVID-19, started in December 2019 has rapidly disseminated to worldwide including California with mortality as high as 20% in the elderly and other more vulnerable populations. At present, worldwide COVID-19 patients have over 3.6 million with over 250,000 deaths. Currently, there are no approved COVID-19 vaccines and only remdesivir has received an FDA-approval for the treatment of COVID-19.

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